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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/785,067	02/25/2004	Eun Joo Jang	3811-0139P	8930
2292	7590	03/10/2006		EXAMINER
BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			NOVACEK, CHRISTY L	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 03/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

H.F

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/785,067	JANG ET AL.	
	<b>Examiner</b> Christy L. Novacek	<b>Art Unit</b> 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 15 December 2005.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-16 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-16 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                     | Paper No(s)/Mail Date. _____ .  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input type="checkbox"/> Other: _____ .                                  |

## **DETAILED ACTION**

This office action is in response to the amendment filed December 15, 2005.

### ***Response to Amendment***

The amendment of claim 4 is sufficient to overcome the rejection of claim 4 under 35 U.S.C. 112, second paragraph stated in the previous office action. Therefore, this rejection is withdrawn.

### ***Specification***

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Claim 5 recites the limitation “wherein the surface of the nanocrystals is reduced or oxidized”. Claim 15 recites the limitation “nanocrystal having a chemically reduced or oxidized surface.” The specification does not provide support for the surface of the nanocrystal being oxidized. In the response filed December 15, 2005, Applicant states that paragraphs 0024-0025 of the specification allegedly provide support for these limitations. However, there is nothing in paragraphs 0024-0025 that discuss oxidizing the surface of a nanocrystals. Therefore, the objections are maintained.

### ***Claim Rejections - 35 USC § 102***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-4, 9 and 11-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Dutta (US 6,906,339).

Regarding claims 1, 13 and 15, Dutta discloses surface-treating semiconductor nanocrystals with a reducing agent (col. 4, ln. 29-62).

Regarding claim 2, Dutta discloses that the semiconductor nanocrystals are synthesized by a wet chemistry method (col. 5, ln. 35-45).

Regarding claim 3, Dutta discloses that the semiconductor nanocrystals can be core-shell nanocrystals made of CdS, ZnS, CdSe, ZnSe, ZnTe, CdTe, GaN, GaP, InP or InAs (col. 4, ln. 29-41).

Regarding claim 4, Dutta discloses that the reducing agent can be a solution containing a reducing gas (col. 4, ln. 42-55; col. 7, ln. 35-45).

Regarding claim 9, Dutta discloses that the surface treatment of the nanocrystals can be carried out at 0-100°C (col. 7, ln. 67).

Regarding claim 11, Dutta discloses that the nanocrystals can have a spherical shape (Fig. 1).

Regarding claim 12, Dutta discloses that the nanocrystals can have a size of 2-100 nm (col. 4, ln. 10-20).

Regarding claim 14, Dutta discloses that the semiconductor nanocrystals may be incorporated into a luminescent layer in an organic electroluminescent device, an OLED, which inherently includes a plurality of organic and inorganic layers (col. 12, ln. 32-48).

Regarding claim 16, Dutta discloses that the reducing agent can be hydrogen sulfide or ammonia (col. 4, ln. 42-55; col. 7, ln. 35-45).

Claims 1, 3, 4, 10-13, 15 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Simpson et al. (US 6,853,669).

Regarding claims 1, 13 and 15, Simpson discloses surface-treating semiconductor nanocrystals with a reducing agent (col. 16, ln. 1-34).

Regarding claim 3, Simpson discloses that the semiconductor nanocrystals can be core-shell nanocrystals made of ZnS or CdSe (col. 10, ln. 44-52).

Regarding claim 4, Simpson discloses that the reducing agent can be a reducing gas (col. 16, ln. 1-34).

Regarding claim 10, Simpson discloses that the surface treatment is carried out for about an hour (col. 16, ln. 1-11).

Regarding claim 11, Simpson discloses that the nanocrystals have a spherical shape (Fig. 3).

Regarding claim 12, Simpson discloses that the nanocrystals can have a size anywhere in the nanometer range (col. 15, ln. 55-58).

Regarding claim 16, Simpson discloses that the reducing agent can be hydrogen (col. 16, ln. 1-34).

#### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dutta (US 6,906,339) in view of Rockenberger et al. (US 6,878,184).

Regarding claims 5-7, Dutta does not disclose that the nanocrystals are coordinated by an organic dispersant and dispersing the nanocrystals in a solvent having an affinity with the dispersant. Like Dutta, Rockenberger discloses forming nanocrystals. Rockenberger teaches

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that it is advantageous to form the nanocrystals such that they are coordinated by an organic dispersant of carboxylic acid, such as oleic acid, and dispersing the nanocrystals in a solvent having an affinity with the dispersant because the dispersant can control the size and solubility of the nanocrystals (col. 3, ln. 1-39). At the time of the invention, it would have been obvious to one of ordinary skill in the art to form the nanocrystals such that they are coordinated by an organic dispersant of carboxylic acid, such as oleic acid, and dispersing the nanocrystals in a solvent having an affinity with the dispersant because the dispersant can control the size and solubility of the nanocrystals.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dutta (US 6,906,339).

Regarding claim 8, Dutta does not disclose the ratio at which the nanocrystals and reducing agent are mixed. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use routine experimentation to determine an optimal nanocrystals to reducing agent ratio of the mixture of Dutta, depending upon the material of the nanocrystal and material of the reducing agent because such variables of art recognized importance are subject to routine experimentation and discovery of an optimum value for such variables is obvious. See *In re Aller*, 105 USPQ 233 (CCPA 1955).

#### ***Response to Arguments***

Applicant's arguments filed December 15, 2005 have been fully considered but they are not persuasive.

Regarding the rejection of claims 1 and 15 as being anticipated by Dutta, Applicant argues that Dutta allegedly fails to disclose surface-treating the nanocrystals with a reducing agent. Dutta discloses that dangling bonds on the surface of the nanocrystals are passivated (reduced) by hydrogen. Thus, Dutta discloses surface-treating the nanocrystals with a reducing agent (hydrogen).

Regarding the rejection of claims 1 and 15 as being anticipated by Simpson, Applicant argues that Simpson allegedly fails to disclose surface-treating the nanocrystals with a reducing agent. Simpson discloses annealing nanocrystals in an atmosphere including hydrogen so that nanocrystals become terminated with hydrogen. Thus, the surfaces of the nanocrystals are treated with a reducing agent (hydrogen).

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (571) 272-1839. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLN  
February 28, 2006

  
Zandra V. Smith  
Supervisory Patent Examiner  
